



96057

AMERADA HESS CORPORATION

732-750-6000
732-750-6105 (FAX)

1 HESS PLAZA
WOODBIDGE, NJ 07095-0961

October 31, 1999

Mr. Robert Simpson
Bureau of Environmental Evaluation, Cleanup and Responsibility Assessment
New Jersey Department of Environmental Protection
P.O. Box 432
401 East State Street
Trenton, NJ 08625-0432

**VIA: CERTIFIED MAIL NO. Z 479 224 579
RETURN RECEIPT REQUESTED**

**Re: Former ARCO Terminal
1111 Delancy Street
Newark, Essex County, New Jersey
ISRA Case #86649**

Dear Mr. Simpson:

Enclosed are three copies of the 1999 Third Quarter Remedial Action Progress Report for the former ARCO Terminal, Delancy Street, Newark, New Jersey (ISRA Case No. 86649). Included are the results and discussion of the Third Quarter 1999 Well Gauging and Groundwater Sampling Event (conducted on August 10, 1999) and the results of recent groundwater sampling events (1997-1999). The report also includes the current status of pump and haul activities at the site and a schedule of upcoming activities. Items requiring NJDEP attention and approval are highlighted in Section 6 of the attached report.

Laboratory data (in hardcopy and electronic EDD format) for the August 1999 sampling event are attached to this submittal.

Please contact me at (732) 750-6918 if you have any questions or if you require any further information.

Sincerely,

Alex Sagebien, Supervisor
Refining and Marketing Remediation

s:\mklas\letter99.4\newark.015

960570001

rebu
2/01

OCTOBER 29, 1999

**1999 THIRD QUARTER REMEDIAL ACTION PROGRESS REPORT
AND DELINEATION STATUS REPORT**

FORMER ARCO TERMINAL
1111 Delancy Street
Newark, Essex County, New Jersey
ISRA Case #86649

Prepared for:

Alex Sagebien, Supervisor
Refining and Marketing Remediation
Amerada Hess Corporation
One Hess Plaza
Woodbridge, NJ 07095

Submitted by:



David S. Felton, P.G.

Certified per N.J.S.A. 58:10A-24.1-8
NJ UST Certification No. 0015629

960570002

**1999 THIRD QUARTER REMEDIAL ACTION PROGRESS REPORT
AND DELINEATION STATUS REPORT
FORMER ARCO TERMINAL
NEWARK, ESSEX COUNTY, NEW JERSEY**

TABLE OF CONTENTS

SECTION	PAGE
1.0 INTRODUCTION, SCOPE AND BACKGROUND	1
2.0 RESULTS OF AUGUST 1999 THIRD QUARTER WELL GAUGING AND GROUNDWATER SAMPLING EVENT	4
3.0 ANALYSIS OF RECENT AND CURRENT EVENT GROUNDWATER SAMPLING DATA	7
4.0 RECOMMENDED FUTURE GROUNDWATER MONITORING	9
5.0 PHASE-SEPARATED PRODUCT IN THE LOADING RACK AREA AND RECOVERY STATUS	10
6.0 CONCLUSIONS, RECOMMENDATIONS AND SCHEDULE	11
6.1 <u>Groundwater Delineation</u>	11
6.2 <u>Soil Delineation</u>	11
6.3 <u>Remedial Action Selection</u>	12
6.4 <u>Issues for NJDEP Review and Approval</u>	12

**1999 THIRD QUARTER REMEDIAL ACTION PROGRESS REPORT
AND DELINEATION STATUS REPORT
FORMER ARCO TERMINAL
NEWARK, ESSEX COUNTY, NEW JERSEY**

TABLE OF CONTENTS (Contd.)

TABLES

TABLE 1	WELL GAUGING INFORMATION (August 10, 1999)
TABLE 2	SAMPLING FIELD PARAMETER DATA (August 10, 1999)
TABLE 3	AUGUST 1999 GROUNDWATER ANALYTICAL RESULTS
TABLE 4	HISTORICAL GROUNDWATER ANALYTICAL RESULTS SUMMARY FOR BENZENE, 1997-1999
TABLE 5	HISTORICAL GROUNDWATER ANALYTICAL RESULTS SUMMARY FOR ETHYLBENZENE, 1997-1999
TABLE 6	HISTORICAL GROUNDWATER ANALYTICAL RESULTS SUMMARY FOR TOLUENE, 1997-1999
TABLE 7	HISTORICAL GROUNDWATER ANALYTICAL RESULTS SUMMARY FOR XYLENES, 1997-1999
TABLE 8	HISTORICAL GROUNDWATER ANALYTICAL RESULTS SUMMARY FOR NAPHTHALENE, 1997-1999
TABLE 9	ANALYTICAL RESULTS SUMMARY FOR METHYL TERT-BUTYL ETHER (MTBE), 1998-1999
TABLE 10	ANALYTICAL RESULTS SUMMARY FOR TERTIARY BUTYL ALCOHOL (TBA), 1998-1999
TABLE 11	PROPOSED GROUNDWATER SAMPLING FOR FOURTH QUARTER 1999 EVENT
TABLE 12	LIQUID PHASE HYDROCARBONS (LPH) THICKNESS (FT), JANUARY-OCTOBER 1999

**1999 THIRD QUARTER REMEDIAL ACTION PROGRESS REPORT
AND DELINEATION STATUS REPORT
FORMER ARCO TERMINAL
NEWARK, ESSEX COUNTY, NEW JERSEY**

1.0 INTRODUCTION, SCOPE AND BACKGROUND

The Amerada Hess Corporation (AHC) Newark Delancy Terminal (the site) is located along Delancy Street in the eastern portion of Newark, Essex County, New Jersey. The site consists of approximately 60 acres and is bounded to the north by Delancy Street and a Star Enterprises petroleum storage terminal, to the east by Newark Bay, to the south by a drainage swale, currently undeveloped marshland (owned by Star Enterprises) and the City of Newark Police Firing Range, and to the west by a propane storage facility (Propane Power) and a defunct drum recycling company (Central Drum). The former drum recycling facility is currently a USEPA listed Superfund site. The eastern third of the site is occupied by 10 petroleum storage tanks and a barge docking facility. Terminal offices, a truck loading rack, and a vehicle garage are located in the central portion of the site, along with a petroleum pipeline (Colonial Pipeline) that supplies the terminal. This pipeline enters the terminal from the south. The western portion of the site is currently undeveloped, although a propane storage facility (Propane Power) was formerly located in this area and another branch of the Colonial Pipeline runs along the western edge of the terminal property. The westernmost 10 acres of the site (later expanded to 20 acres) was leased from late 1998 to mid 1999 to a container shipping company. This area was regraded and covered with 6-9 inches of coarse gravel, quarry process and concrete fragments. The shipping company stored empty shipping containers (Sea-Land containers) in the area. The graveled area, currently not in use, is scheduled for leasing to trucking and other transportation companies. Asphalt, gravel or cement pads cover the majority of the eastern and central portions of the site, with the remainder of the site unpaved. The entire facility is underlain by fill averaging 10-12 feet in thickness with the exception of the extreme southern portion of the site. Marsh sediments underlying the fill consist of silts and clays with varying amounts of fine sand and organic material.

AHC, the current owner of the facility, accepted environmental responsibility for the site in December 1997 from Atlantic Richfield Corporation (ARCO), the previous property owner. The New Jersey Department of Environmental Protection (NJDEP) commented on previous environmental investigations at the site in letters dated March 26, 1997, September 15, 1997, and January 8, 1998, requesting additional soil and groundwater delineation activities at the site. AHC responded to these letters in a response document dated February 27, 1998. The February 27 document contained a workplan to perform additional soil and groundwater investigation activities at the site. The NJDEP approved AHC's groundwater sampling and soil delineation plan in a July 7, 1998 comment letter. AHC responded to the comments of the July 7, 1998 NJDEP letter in a letter dated July 31, 1998.

The soil and groundwater sampling requested by the NJDEP in the comment letters listed above were performed during the third and fourth quarters of 1998. Supplemental soil delineation sampling was conducted on August 11-13, 1998, with the results included in the December 1, 1998 Soil Remedial Investigation Report. Quarterly groundwater sampling events were conducted on August 3-4, 1998 and November 2-3, 1998. The results of these sampling events were included in the October 15, 1998 Third Quarter 1998 Remedial Action Progress Report and the January 29, 1999 Fourth Quarter 1998 Remedial Action Progress Report, respectively.

A meeting was held at the site on November 13, 1998 between AHC representatives, FWENC representatives and Mr. Robert Simpson, NJDEP Case Manager, to review the current status of the environmental investigations at the site and discuss possible future activities. After reviewing the site and its history, the decision was made to defer discussion of remedial action alternatives until the investigation parameters were fully delineated at the site and to postpone further delineation activities until a thorough review of historical environmental investigations was conducted to avoid duplication of previous work.

AHC has completed reviews of historical soil and groundwater sampling at the site. The results of the soil sampling review, along with proposed additional soil sampling to complete site soil delineation, were discussed in the Fourth Quarter 1998 Remedial Action

Progress Report. Responses to an NJDEP letter dated December 24, 1998 were also included in the Fourth Quarter 1998 Report. The results of the groundwater sampling review were discussed in the First Quarter 1999 Remedial Action Progress Report.

AHC received an NJDEP comment letter dated May 14, 1999 referring to the Third and Fourth Quarter 1998 Remedial Action Progress Reports. The comment letter raised issues concerning fill delineation, delineation of AOCs in the north-central and eastern portions of the site, pump and haul interim remedial measures in the loading rack area, monitoring well repair/replacement, and parameter readings collected during well purging. Responses to the May 14, 1999 comment letter and a workplan for supplemental soil delineation designed to address all soil delineation issues for the site currently outstanding were included in the Fourth Quarter 1998 Remedial Action Progress Report. AHC is awaiting NJDEP approval of the supplemental delineation workplan, and will implement these activities following receipt of approval.

The results of the Third Quarter 1999 Groundwater Sampling Event are presented and discussed in the following report. AHC has compiled the laboratory data for this event into the EDD format. These data are presented on a disk attached to this report. A groundwater sampling plan for the Fourth Quarter 1999 Groundwater Sampling Event (November 1999) is also included.

Additional active site issues include the remediation of phase-separated hydrocarbon (PSH) in the loading rack area and the current status of all designated Areas of Concern (AOCs) within site boundaries. The current status of PSH remediation in the loading rack area is discussed within this report. A telephone call with Mr. Robert Simpson, NJDEP Case Manager, was held on March 31, 1999. The issue of the current status of site AOCs was discussed during this telephone call. The status of the AOCs will be reviewed by the NJDEP, with the results to be included in a letter. AHC is awaiting the results of this review, and will incorporate these results into soil/groundwater delineation activities for the site.

2.0 RESULTS OF AUGUST 1999 THIRD QUARTER WELL GAUGING AND GROUNDWATER SAMPLING EVENT

Monitoring wells at the site were gauged and sampled on August 10, 1999. Well gauging was accomplished using a sonic interface probe. The wells were sampled in accordance with previously approved sampling methods and the revised long-term monitoring plan identified in the Second Quarter 1999 Remedial Action Progress Report. The locations of all current site wells are shown on **Figure 1**. This figure shows the existing site structures, including piezometer and monitoring well locations.

Monitoring well gauging and inspection results are presented in **Table 1**. **Table 1** well data include the name of each well, the casing and water elevations, depth to screen, measured and historical well depths, depth to product and product thickness (if present), the current status of the well (good condition, or if damaged, the type of damage) and pertinent comments. Wells destroyed, abandoned or not found (over several sampling events) are not listed in this table. A total of 71 wells are known to have been installed historically at the site, of which 45 are currently usable. Wells MW10R and PZ17 have obstructed casings and should be abandoned, the casing of PZ10 is loose, and wells W5R, MW7R, MW11 through MW15, PZ16 and TPZ3 need surface completion repairs. These well abandonments and repairs will be scheduled following NJDEP approval concurrent with the installation of the supplemental soil delineation borings identified in the Second Quarter 1999 Remedial Action Progress Report. Well GM17 and well W14 require resurveying before inclusion in potentiometric maps. AHC will perform this resurveying after conducting the above repairs.

The measured depth to water (DTW) of site wells gauged in August 1999 ranged from 2.55 feet at well TPZ1 to 10.27 feet at well PZ10 below top of casing (**Table 1**). Groundwater elevation data from all active wells with surveyed inner casings are included in **Figure 2**, the groundwater potentiometric map. AHC has also included the NJDEP-required Groundwater Contour Map Reporting Form as **Appendix A** of this report. A measurable (0.01 foot or more) thickness of PSH was observed in wells MW11, MW13, MW14, MW15, GM17 and W15. Gravity-adjustment of groundwater elevations for the

wells containing LPH was performed using an adjustment factor of 0.74 (the average density of the PSH relative to the 1.00 density of water). A product sheen (<0.01 ft thickness) was observed in well W2. The current status of product recovery activities at the site is discussed in **Section 5** of this report.

Analysis of **Figure 2** indicates that groundwater generally flows in an easterly direction toward Newark Bay, as would be expected under normal flow conditions. A groundwater mound is located in the vicinity of the loading rack, and water in the north-central portion of the site flows to the north. The mound and local northward groundwater flow have been documented in site reports for over 10 years. Roux Associates, Inc. and Geraghty & Miller, Inc. determined that the mounding was caused by a ridge of impermeable meadow mat in the vicinity of the loading rack. Roux Associates, Inc. and Geraghty & Miller, Inc. also determined that the northward groundwater flow was likely due to the continued operation of PSH recovery systems at the Star Enterprises terminal located north of the site. Based on observed field data and the Star Enterprises NJDEP file search referenced in Section 1 of the First Quarter 1999 Quarterly Progress Report, AHC is in agreement with these interpretations of site groundwater flow. The potentiometric contours in the vicinity of Tank 0304 show a small deviation in the vicinity of this tank. This mound, along with the local lead and VOA detections in soils, indicates that a historic leak from this tank is the most likely source of the dissolved hydrocarbons observed in wells MW9R and MW2 during current and recent groundwater sampling events.

Field parameters were gauged during well purging and before and after well sampling to ensure that the aquifer had equilibrated prior to sampling. The parameters pH, electrical conductivity (EC), turbidity, dissolved oxygen (DO), temperature and salinity were field determined. **Table 2** presents the groundwater conditions in each well immediately prior to sample collection.

NJDEP-certified Accutest Laboratories, Inc. of Dayton, NJ conducted laboratory analyses of samples collected from site wells. Wells MW-2, MW4, MW8R, MW-9R, W3 and W9 were sampled for Benzene, Ethylbenzene, Toluene and Total Xylenes (BTEX), Arsenic, Lead, Methyl Tert Butyl Ether (MTBE) and Tertiary Butyl Alcohol (TBA). The Arsenic and Lead samples were collected using EPA-approved low-flow sampling methods

to minimize turbidity. The laboratory results of the above analyses are presented in **Table 3**. A complete laboratory data package is included in **Appendix B**. The results of the August 1999 and recent groundwater sampling events are analyzed in **Section 3**.

3.0 ANALYSIS OF RECENT AND CURRENT EVENT GROUNDWATER SAMPLING DATA

The BTEX, Naphthalene, MTBE and TBA recent and current analytical results (1997-1999) are summarized in **Tables 4** through **10**. The most recent sampling data from site wells from samples taken over the 1998-1999 period for BTEX, MTBE and TBA are shown in **Figures 3** through **8**. Benzene (**Table 4**) was detected above the Groundwater Quality Standard (GWQS) of 1 ug/l in wells MW2, MW4, MW8R, MW9R, W3 and W9 during the August 1999 (current) sampling event. This pattern of detections shows that Benzene concentrations continue to be highest in the vicinity of the loading rack and east of Tank 304, as shown in **Figure 3** and **Figure 8** of the Fourth Quarter 1998 Remedial Action Progress Report (**Appendix C**). Ethylbenzene was not detected above the GWQS of 700 ug/l in any well sampled during the current event. **Table 5**, **Figure 4** and **Figure 9** of **Appendix C** show that Ethylbenzene (generally in concentrations below the GWQS) is concentrated in the loading rack area. Toluene was detected above the GWQS of 1000 ug/l in well W3 during the current event. **Table 6**, **Figure 5** and **Figure 10** of **Appendix C** show that Toluene is concentrated in the loading rack area, with low-level detections (<15ug/l) in wells adjacent to Newark Bay. Total Xylenes were detected above the GWQS of 1000 ug/l in well W3 during the current event. **Table 7**, **Figure 6** and **Figure 11** of **Appendix C** show that these Total Xylenes detections generally follow the same patterns as those noted for Toluene. Naphthalene (**Table 8**) has not been detected above the GWQS of 300 ug/l in any site well sampled from 1997-1999, and thus was not sampled during the current event. MTBE (**Table 9**) was not detected above the GWQS of 70 ug/l in any sampled well during the current event. MTBE is concentrated in the loading rack area, with a lesser concentration in wells adjacent to Newark Bay (see **Figure 7** and **Figure 12** of **Appendix C**). TBA (**Table 10**) was detected above the GWQS of 100 ug/l in wells PZ8 and PZ11. **Table 10**, **Figure 8** and **Figure 13** of **Appendix C** show that TBA is present at the loading rack area and in wells along Newark Bay, generally in concentrations above GWQS.

As stated above, metal samples (arsenic and lead) were collected from wells MW-2, MW4, MW8R, MW-9R, W3 and W9 during the current event. The samples were collected to complete groundwater delineation of confirmed contaminants of concern at the site, which include BTEX, MTBE, TBA, Arsenic and Lead. Exceedances of GWQS standards were noted in samples from wells MW2 (Arsenic), MW4 (Arsenic and Lead), MW9R (Arsenic and Lead), W3 (Arsenic and Lead) and W9 (Lead) during the Third Quarter 1999 Sampling Event. The metals samples were collected using EPA-approved low-flow sampling methods to minimize turbidity except at well PZ8, for reasons discussed previously. AHC notes that while exceedances of metals GWQS have occurred, the majority of metals analyses performed on samples from site wells have been significantly below GWQS or non-detect (ND).

AHC has compiled a comprehensive groundwater database for this site comprised of 1997-1999 data (**Tables 4-10**). Based on this database, AHC will continue to sample selected wells to monitor natural attenuation at the site. AHC is awaiting NJDEP approval of this long-term monitoring strategy, originally presented in Section 4 of the Second Quarter 1999 Remedial Action Progress Report and summarized below.

4.0 RECOMMENDED FUTURE GROUNDWATER MONITORING

Analysis of recent groundwater sampling data (1997-present) shows that groundwater compounds at the site are well delineated. Based on the 1997-1999 groundwater database, AHC has included the following wells for routine (semi-annual) monitoring pending NJDEP approval: wells MW9R, MW2 and MW8R along Newark Bay; wells W9 and MW14 in the loading rack area (if well MW14 contains LPH, an adjacent well will be sampled); and well MW4 south of the loading rack. All of these wells will be sampled for BTEX, MTBE and TBA on a long-term basis (**Table 11**). The wells will be sampled once for Arsenic and Lead. Wells exhibiting exceedances of GWQS for these metals will be resampled to confirm the exceedance. As Naphthalene has not been detected above GWQS in any site well, this constituent will not be included in the routine monitoring.

5.0 PHASE-SEPARATED PRODUCT IN THE LOADING RACK AREA AND RECOVERY STATUS

AHC has periodically engaged in pump and haul activities from loading rack area wells at the site from February 1998 to present. The history of these activities and a description of the recovery method and waste disposal method were included in previous reports.

Pump and haul activities were discontinued following the December 11, 1998 pumping event, when it was observed that LPH was absent from most Loading Rack Area wells and was present only as a light sheen in wells MW13, MW15 and W15. A supplemental gauging event of the loading rack wells, performed on January 12, 1999, confirmed the continued absence of LPH in measurable quantity onsite. AHC has continued to gauge the loading rack area wells on a monthly basis (**Table 12**). The monthly gauging events from January-April 1999 showed that LPH was present in some loading rack area wells, generally in thicknesses less than 0.01 foot (sheen). AHC therefore installed PetroTrap PSH collectors during February 1999 in wells MW13 and MW15, both of which exhibited sheens, and has since relocated the PetroTraps based on the results of ongoing loading rack area well gauging (**Table 12**). The PetroTraps have been serviced monthly.

LPH thicknesses increased during May-June 1999 due to increased precipitation at the site mobilizing product from the vadose zone. Pump and haul activities were resumed on June 3, 1999 and have continued on a quarterly basis. **Table 12** shows that pump and haul on a quarterly basis is controlling PSH within the affected loading rack area wells.

6.0 CONCLUSIONS, RECOMMENDATIONS AND SCHEDULE

6.1 Groundwater Delineation

Analysis of current and historic groundwater sampling data shows that dissolved phase volatile compounds are concentrated in the loading rack area, with lesser concentrations in areas adjacent to Newark Bay. The levels of the volatile compounds have decreased over time due to recovery efforts and natural attenuation. MTBE is present in the loading rack area, with TBA present in the loading rack area and in wells located along Newark Bay. Semivolatile (PAH) compounds are present in low levels in most site wells. This distribution is consistent with the PAH distribution in site soils identified in the Fourth Quarter 1998 Report, and is likely related to low-level PAH concentrations in most fill materials historically used at the site. Metals occur sporadically in levels above GWQS at the site. The only metals showing exceedances of GWQS have been Lead, Chromium and Arsenic. TPHC levels in site wells have been low-level to ND.

AHC has generally delineated the extent of groundwater contamination at this site. Utilizing the current groundwater database, AHC reevaluated long-term monitoring needs. The proposed monitoring wells for long-term semi-annual sampling are shown in **Table 11**.

AHC has installed PetroTrap PSH collectors in site wells that continue to be affected by PSH accumulations. These collectors are serviced monthly, and all loading rack area wells are gauged monthly to check for PSH accumulation. Based on recent gauging results, pump and haul activities have been scheduled on a quarterly basis.

6.2 Soil Delineation

AHC, in the Fourth Quarter 1998 Report, showed that the parameters of concern at the site (volatile, semivolatile, TPHC and lead) are mostly delineated within site boundaries. The NJDEP responded in a letter dated May 14, 1999. In response to this letter, AHC has proposed to advance 25 fill delineation borings across the site, to be continuously logged and sampled as detailed in the Second Quarter 1999 Remedial Action Progress Report. In addition to fill delineation, these borings will serve to vertically delineate COCs in the Propane Power, Septic System/Leach Field, and Loading Rack

AOCs. Data from the 25 proposed borings is expected to complete site-wide delineation of COCs at the site, and any further delineation should be minor and limited to addressing data gaps in small areas. AHC is awaiting NJDEP approval for these activities. The soil borings are planned for installation concurrent with the well abandonment and repair activities detailed in **Table 1**, as shown on the Implementation Schedule (**Figure 9**).

6.3 Remedial Action Selection

Remedial action selection issues for the site include the following:

- Refer to **Figure 9**, the Implementation Schedule, which shows that the RAWP for the site will be submitted upon delineation of site groundwater and soils, following NJDEP's approval and concurrence that the site is fully delineated.
- AHC will continue LPH interim remedial measures as necessary.
- There are no potable wells in the area of the site; therefore, current conditions do not pose an immediate threat to human health or the environment.
- Any changes in the implementation schedule will be proposed to the NJDEP in future reports.

6.4 Issues for NJDEP Review and Approval

Issues requiring NJDEP review and approval include the following:

- AHC requests that NJDEP review the status of all AOCs at the site and respond in a letter. AHC will use this information to complete delineation of site soils/groundwater.
- AHC requests that the NJDEP review the proposed list of wells to be sampled for long-term monitoring on a semi-annual basis (**Section 4** and **Table 11**).
- AHC requests approval of workplan for installation of supplementary soil delineation borings S-1 through S-25 (**Section 6.2**), and approval of the variance requested in **Section 6.1** of the Second Quarter 1999 Remedial Action Progress Report.
- AHC requests that the NJDEP provide a list of monitoring wells, if any, it deems require replacing. This list will be evaluated and the well replacements will occur concurrent with the installation of the 25 soil borings listed above.

TABLES

Table 1
Former ARCO Terminal
Well Gauging Information
August 10, 1999

Well Name	Latitude Coordinate	Longitude Coordinate	Casing Elevation	Depth to Screen	Historical Total Depth	Measured Total Depth	Water Depth	Product Depth	Product Thickness	Corrected Water Elevation	Well Status	Comments and Recommendations
MW1	40° 42' 21.28" N	74° 07' 15.48" W	10.99	2.00	15.56	13.87	4.01	ND	0.00	6.98	Good Condition	4" PVC flushmount casing.
MW2	40° 42' 18.41" N	74° 07' 14.48" W	12.74	3.00	20.40	19.08	8.74	ND	0.00	4.00	Good Condition	4" PVC stickup casing.
MW3	40° 42' 14.11" N	74° 07' 16.37" W	11.93	3.00	18.00	17.85	5.88	ND	0.00	5.95	Good Condition	4" PVC stickup casing.
MW4	40° 42' 21.81" N	74° 07' 23.64" W	13.25	4.70	14.70	14.40	7.89	ND	0.00	5.56	Good Condition	4" PVC stickup casing.
MW5	40° 42' 26.80" N	74° 07' 32.75" W	9.58	NA	14.60	14.60	2.71	ND	0.00	6.87	Good Condition	4" PVC stickup casing.
MW7R	40° 42' 26.28" N	74° 07' 22.94" W	12.08	2.48	11.00	11.88	5.96	ND	0.00	6.12	Good Condition	4" PVC stickup casing. Cement pad cracked and needs repair.
MW8R	40° 42' 15.91" N	74° 07' 15.48" W	13.19	3.59	12.00	13.85	6.94	ND	0.00	6.25	Good Condition	4" PVC stickup casing.
MW9R	40° 42' 19.44" N	74° 07' 14.46" W	12.97	3.77	12.00	13.92	6.35	ND	0.00	6.62	Good Condition	4" PVC stickup casing.
MW10R	40° 42' 20.73" N	74° 07' 18.83" W	12.39	2.49	11.00	--	--	--	--	--	Obstructed	Well casing blocked with soil. Well will be abandoned.
MW11	40° 42' 24.40" N	74° 07' 22.74" W	11.20	1.00	11.00	10.52	3.82	3.81	0.01	7.39	Good Condition	4"PVC flushmount casing. Cement pad cracked and needs repair.
MW12	40° 42' 22.99" N	74° 07' 22.39" W	10.53	1.00	11.00	10.93	2.88	ND	0.00	7.67	Good Condition	4"PVC flushmount casing. Box and cement pad need repair.
MW13	40° 42' 24.35" N	74° 07' 21.31" W	11.27	1.00	11.00	11.00	4.26	4.21	0.05	7.05	Good Condition	4"PVC flushmount casing. Cement pad cracked and needs repair.
MW14	40° 42' 24.00" N	74° 07' 21.73" W	11.27	1.00	11.00	10.80	4.89	4.87	0.02	6.39	Good Condition	4"PVC flushmount casing. Cement pad cracked and needs repair.
MW15	40° 42' 25.41" N	74° 07' 21.76" W	11.31	1.00	11.00	11.00	3.92	3.88	0.04	7.42	Good Condition	4"PVC flushmount casing. Cement pad cracked and needs repair. Inner cap damaged.
GM17	40° 42' 24.40" N	74° 07' 22.75" W	?	NA	11.50	11.73	3.96	3.89	0.07	?	Good Condition	4" PVC flushmount casing. Survey data needed.
PZ1	40° 42' 31.91" N	74° 07' 28.73" W	11.97	NA	7.00	6.13	4.64	ND	0.00	7.13	Good Condition	2" PVC stickup casing.
PZ8	40° 42' 18.55" N	74° 07' 18.50" W	12.95	2.45	7.45	6.98	6.32	ND	0.00	6.63	Good Condition	2" PVC stickup casing.
PZ10	40° 42' 14.00" N	74° 07' 17.76" W	16.58	5.48	11.00	11.03	10.27	ND	0.00	6.31	Poor Condition	1" PVC - Used "Water Only" probe. Useful as piezometer only. Well casing loose.
PZ11	40° 42' 16.60" N	74° 07' 14.90" W	11.80	2.30	7.30	7.30	6.43	ND	0.00	5.37	Good Condition	2" PVC stickup casing.
PZ17	40° 42' 23.48" N	74° 07' 18.98" W	10.69	NA	7.00	--	--	--	--	--	Obstructed	1" PVC Well blocked with soil. Well will be abandoned.
PZ20	40° 42' 20.25" N	74° 07' 14.13" W	12.53	3.03	6.03	6.19	6.93	ND	0.00	5.60	Good Condition	2" PVC stickup casing.
PZ22	40° 42' 25.65" N	74° 07' 22.65" W	11.91	1.61	6.61	6.57	4.78	ND	0.00	7.13	Good Condition	2" PVC stickup casing. No lock.
PZ24R	40° 42' 23.54" N	74° 07' 18.48" W	12.11	2.51	6.00	4.63	Dry	ND	0.00	Dry	Good Condition	2" PVC stickup casing.
PZ25	40° 42' 26.63" N	74° 07' 25.71" W	14.05	1.50	6.50	6.25	6.38	ND	0.00	7.67	Good Condition	2" PVC stickup casing.
PZ26	40° 42' 26.68" N	74° 07' 26.41" W	13.75	1.50	6.50	6.21	6.74	ND	0.00	7.01	Good Condition	2" PVC stickup casing.
TPZ1	40° 42' 25.55" N	74° 07' 23.35" W	9.92	NA	5.88	5.75	2.62	ND	0.00	7.30	Good Condition	4" PVC flushmount casing.
TPZ3	40° 42' 26.44" N	74° 07' 21.81" W	10.43	NA	5.05	5.19	3.16	ND	0.00	7.27	Good Condition	4" PVC flushmount casing. Missing star cover.
TPZ4	40° 42' 26.17" N	74° 07' 21.47" W	10.60	NA	5.50	5.22	3.26	ND	0.00	7.34	Good Condition	4" PVC flushmount casing.
TPZ5	40° 42' 25.24" N	74° 07' 20.31" W	10.15	NA	5.43	5.50	2.06	ND	0.00	8.09	Good Condition	4" PVC flushmount casing.
TPZ6	40° 42' 24.20" N	74° 07' 19.57" W	10.29	NA	11.29	11.24	3.46	ND	0.00	6.83	Good Condition	4" PVC flushmount casing.
W1	40° 42' 23.42" N	74° 07' 21.87" W	10.58	1.00	10.00	9.73	3.00	ND	0.00	7.58	Good Condition	4" PVC flushmount casing.
W2	40° 42' 24.68" N	74° 07' 21.97" W	11.61	1.00	10.00	9.75	4.26	Sheen	0.00	7.35	Good Condition	4" PVC flushmount casing.
W3	40° 42' 23.92" N	74° 07' 21.15" W	10.38	1.00	10.00	7.00	2.55	ND	0.00	7.83	Good Condition	4" PVC flushmount casing.
W4	40° 42' 25.34" N	74° 07' 21.06" W	11.47	1.00	10.00	7.28	4.15	ND	0.00	7.32	Good Condition	4" PVC flushmount casing.
W5R	40° 42' 26.17" N	74° 07' 21.52" W	10.56	1.00	11.00	10.79	3.36	ND	0.00	7.20	Good Condition	4" flushmount casing. Flushmount box missing - repairs needed.
W6	40° 42' 25.42" N	74° 07' 20.42" W	10.18	1.00	10.00	9.86	2.67	ND	0.00	7.31	Good Condition	4" PVC flushmount casing.
W7	40° 42' 24.90" N	74° 07' 19.74" W	11.50	1.80	11.10	10.82	4.30	ND	0.00	7.20	Good Condition	4" PVC stickup casing. No outer casing.
W8	40° 42' 24.26" N	74° 07' 19.10" W	11.59	1.50	11.00	10.45	4.50	ND	0.00	7.09	Good Condition	4" PVC stickup casing. No outer casing.
W9	40° 42' 24.20" N	74° 07' 18.89" W	11.83	1.60	11.10	10.87	4.89	ND	0.00	7.14	Good Condition	4" PVC stickup casing. No outer casing.

Table 1
Former ARCO Terminal
Well Gauging Information
August 10, 1999

Well Name	Latitude Coordinate	Longitude Coordinate	Casing Elevation	Depth to Screen	Historical Total Depth	Measured Total Depth	Water Depth	Product Depth	Product Thickness	Corrected Water Elevation	Well Status	Comments and Recommendations
W10	40° 42' 23.85" N	74° 07' 19.07" W	12.28	1.50	11.00	6.80	4.38	ND	0.00	7.90	Good Condition	4" PVC stickup casing. No outer casing.
W11	40° 42' 24.21" N	74° 07' 19.59" W	12.36	1.66	11.16	10.35	5.04	ND	0.00	7.32	Good Condition	4" PVC stickup casing. No outer casing.
W12	40° 42' 23.60" N	74° 07' 20.69" W	12.37	1.60	11.00	10.46	5.04	ND	0.00	7.33	Good Condition	4" PVC stickup casing. No outer casing.
W13	40° 42' 24.49" N	74° 07' 20.06" W	10.73	0.75	10.00	9.25	3.29	ND	0.00	7.44	Good Condition	4" PVC flushmount casing.
W14	40° 42' 22.66" N	74° 07' 20.86" W	11.80	1.28	10.78	8.90	3.55	ND	0.00	8.25	Good Condition	4" PVC stickup casing.
W15	40° 42' 24.04" N	74° 07' 23.68" W	12.56	1.46	10.96	10.78	4.88	4.85	0.01	7.71	Good Condition	4" PVC stickup casing.
W16	40° 42' 23.92" N	74° 07' 24.17" W	11.94	1.50	11.00	10.60	4.60	ND	0.00	7.34	Good Condition	4" PVC stickup casing. Resurvey of casing needed.
Unknown	40° 42' 21.82" N	74° 07' 27.55" W	?	-	-	11.06	NM	ND	0.00	?	Good Condition	4" PVC flushmount casing. Cement pad needs repair.* Survey data needed.

NOTES:

1. - Indicates no data.
2. ND = not detected.
3. The recommended well abandonment and repair activities listed above will occur along with the supplemental soil delineation activities proposed in the Second Quarter 1999 Progress Report.
4. Elevation data in ft mean sea level. Other measurements are from top of well casing.
5. NM = Not Measured.
6. All measurements in feet unless otherwise indicated.
7. * Based on design and location, this well is likely PZ16, which was not located during earlier sampling events and thought to be destroyed. Well located approximately 275 feet west of MW-4.

Table 2
Sampling Field Parameter Data
August 10, 1999
Former ARCO Terminal
Newark, NJ

Well #	pH (S.U.)	EC (MS/CM)	Turbidity (NTU)	DO (PPM)	Temp. (C)	Salinity (%)	Appearance
MW2	6.89	0.874	79	3.90	19.0	0.03	Clear, strong odor.
MW4	6.70	2.580	233	4.14	18.1	0.12	Slightly turbid, mild odor.
MW8R	6.29	0.479	19	3.96	19.1	0.01	Clear, mild odor.
MW9R	6.76	0.706	150	3.90	19.0	0.03	Slightly turbid, mild odor.
W3	6.66	2.770	107	2.64	28.7	0.13	Slightly turbid, strong odor.
W9	6.77	0.366	36	3.74	20.2	0.01	Black tint, strong odor.

Notes:

Temperature is measured in degrees Celsius.

pH is measured in standard units (S. U.).

EC = Electrical Conductivity, expressed in milliSiemens per centimeter (MS/CM).

DO = Dissolved Oxygen, expressed in parts per million (PPM).

NTU = Nephelometric Turbidity Unit.

All of the wells were purged at a reduced flow rate (0.5 liters/minute) to ensure lower turbidity for metals analyses and were sampled for metals from the pump discharge.

Volatile samples were collected using dedicated, disposable bailers.

The data above represent parameter data collected following parameter stabilization immediately prior to sampling. Complete purge data are included in Appendix A.

960570020

Table 3
August 1999 Groundwater Analytical Results
Former ARCO Terminal
Newark, NJ

LABORATORY PROJECT NO.	SAMPLE LOCATION	SAMPLE NUMBER	SAMPLE DATE	CONSTITUENT ANALYZED	ANALYTICAL RESULT	CONC.	UNITS	LAB MDL	GWQS (ug/l)	>GWQS (YES/NO)	ANALYTICAL METHOD
E53897-1	MW2	53897-1	8/10/99	Arsenic		19.1	ug/l	5	8	YES	EPA 200.7
E53897-1	MW2	53897-1	8/10/99	Benzene		424	ug/l	5	1	YES	EPA 601/602
E53897-1	MW2	53897-1	8/10/99	Ethylbenzene		8.7	ug/l	5	700	NO	EPA 601/602
E53897-1	MW2	53897-1	8/10/99	Lead		3.2	ug/l	3	10	NO	EPA 200.7
E53897-1	MW2	53897-1	8/10/99	Methyl Tert Butyl Ether		191	ug/l	5	70*	YES	EPA 601/602
E53897-1	MW2	53897-1	8/10/99	Tertiary Butyl Alcohol		24400	ug/l	1000	100*	YES	EPA 601/602
E53897-1	MW2	53897-1	8/10/99	Toluene		11.6	ug/l	5	1000	NO	EPA 601/602
E53897-1	MW2	53897-1	8/10/99	Xylenes (total)		12.6	ug/l	5	1000	NO	EPA 601/602
E53897-2	MW4	53897-2	8/10/99	Arsenic		17.1	ug/l	5	8	YES	EPA 200.7
E53897-2	MW4	53897-2	8/10/99	Benzene		2.9	ug/l	0.5	1	YES	EPA 601/602
E53897-2	MW4	53897-2	8/10/99	Ethylbenzene	ND	0	ug/l	0.5	700	NO	EPA 601/602
E53897-2	MW4	53897-2	8/10/99	Lead		224	ug/l	3	10	YES	EPA 200.7
E53897-2	MW4	53897-2	8/10/99	Methyl Tert Butyl Ether		1.1	ug/l	0.5	70*	NO	EPA 601/602
E53897-2	MW4	53897-2	8/10/99	Tertiary Butyl Alcohol	ND	0	ug/l	100	100*	NO	EPA 601/602
E53897-2	MW4	53897-2	8/10/99	Toluene		2.9	ug/l	0.5	1000	NO	EPA 601/602
E53897-2	MW4	53897-2	8/10/99	Xylenes (total)		2.6	ug/l	0.5	1000	NO	EPA 601/602
E53897-3	MW8R	53897-3	8/10/99	Arsenic	ND	0	ug/l	5	8	NO	EPA 200.7
E53897-3	MW8R	53897-3	8/10/99	Benzene		1.2	ug/l	0.5	1	YES	EPA 601/602
E53897-3	MW8R	53897-3	8/10/99	Ethylbenzene	ND	0	ug/l	0.5	700	NO	EPA 601/602
E53897-3	MW8R	53897-3	8/10/99	Lead		9.7	ug/l	3	10	NO	EPA 200.7
E53897-3	MW8R	53897-3	8/10/99	Methyl Tert Butyl Ether		50.4	ug/l	0.5	70*	NO	EPA 601/602
E53897-3	MW8R	53897-3	8/10/99	Tertiary Butyl Alcohol		217	ug/l	100	100*	YES	EPA 601/602
E53897-3	MW8R	53897-3	8/10/99	Toluene	ND	0	ug/l	0.5	1000	NO	EPA 601/602
E53897-3	MW8R	53897-3	8/10/99	Xylenes (total)	ND	0	ug/l	0.5	1000	NO	EPA 601/602
E53897-4	MW9R	53897-4	8/10/99	Arsenic		9.4	ug/l	5	8	YES	EPA 200.7
E53897-4	MW9R	53897-4	8/10/99	Benzene		317	ug/l	2.5	1	YES	EPA 601/602
E53897-4	MW9R	53897-4	8/10/99	Ethylbenzene	ND	0	ug/l	2.5	700	NO	EPA 601/602
E53897-4	MW9R	53897-4	8/10/99	Lead		24.6	ug/l	3	10	YES	EPA 200.7

Table 3
August 1999 Groundwater Analytical Results
Former ARCO Terminal
Newark, NJ

LABORATORY PROJECT NO.	SAMPLE LOCATION	SAMPLE NUMBER	SAMPLE DATE	CONSTITUENT ANALYZED	ANALYTICAL RESULT	CONC.	UNITS	LAB MDL	GWQS (ug/l)	>GWQS (YES/NO)	ANALYTICAL METHOD
E53897-4	MW9R	53897-4	8/10/99	Methyl Tert Butyl Ether		8.4	ug/l	2.5	70*	NO	EPA 601/602
E53897-4	MW9R	53897-4	8/10/99	Tertiary Butyl Alcohol		2010	ug/l	500	100*	YES	EPA 601/602
E53897-4	MW9R	53897-4	8/10/99	Toluene	ND	0	ug/l	2.5	1000	NO	EPA 601/602
E53897-4	MW9R	53897-4	8/10/99	Xylenes (total)	ND	0	ug/l	2.5	1000	NO	EPA 601/602
E53897-5	W3	53897-5	8/10/99	Arsenic		97	ug/l	5	8	YES	EPA 200.7
E53897-5	W3	53897-5	8/10/99	Benzene		14000	ug/l	100	1	YES	EPA 601/602
E53897-5	W3	53897-5	8/10/99	Ethylbenzene		352	ug/l	25	700	NO	EPA 601/602
E53897-5	W3	53897-5	8/10/99	Lead		2400	ug/l	3	10	YES	EPA 200.7
E53897-5	W3	53897-5	8/10/99	Methyl Tert Butyl Ether		5400	ug/l	100	70*	YES	EPA 601/602
E53897-5	W3	53897-5	8/10/99	Tertiary Butyl Alcohol	ND	0	ug/l	5000	100*	NO	EPA 601/602
E53897-5	W3	53897-5	8/10/99	Toluene		7690	ug/l	100	1000	YES	EPA 601/602
E53897-5	W3	53897-5	8/10/99	Xylenes (total)		5700	ug/l	25	1000	YES	EPA 601/602
E53897-6	W9	53897-6	8/10/99	Arsenic	ND	0	ug/l	5	8	NO	EPA 200.7
E53897-6	W9	53897-6	8/10/99	Benzene		412	ug/l	2.5	1	YES	EPA 601/602
E53897-6	W9	53897-6	8/10/99	Ethylbenzene		10	ug/l	2.5	700	NO	EPA 601/602
E53897-6	W9	53897-6	8/10/99	Lead		13.8	ug/l	3	10	YES	EPA 200.7
E53897-6	W9	53897-6	8/10/99	Methyl Tert Butyl Ether	ND	0	ug/l	2.5	70*	NO	EPA 601/602
E53897-6	W9	53897-6	8/10/99	Tertiary Butyl Alcohol	ND	0	ug/l	500	100*	NO	EPA 601/602
E53897-6	W9	53897-6	8/10/99	Toluene		10.2	ug/l	2.5	1000	NO	EPA 601/602
E53897-6	W9	53897-6	8/10/99	Xylenes (total)		28.8	ug/l	2.5	1000	NO	EPA 601/602

NOTES:

1. Data provided by Accutest Laboratories Inc., Dayton, NJ (NJ Laboratory Certification No. 12129).
2. MDL = Method Detection Limit.
3. GWQS = Groundwater Quality Standards.
4. * = Standard not promulgated as of this report submittal date.
5. NA = Not Available.

Table 4
Historical Groundwater Analytical Results Summary for Benzene
Former ARCO Terminal
Newark, NJ

Date Sampled:

Well #	1/28/97	4/22/97	7/22/97	12/23/97	1/27/98	5/19-21/98	8/3-4/98	11/2-3/98	2/3-4/99	5/11/99	8/10/99
MW1	ND (0.5)	ND (1.0)	ND (1.0)	ND(1.0)	ND (0.2)	ND (1.0)	ND (0.2)	ND (0.5)	ND (0.5)	NS	NS
MW2	450	740	43	560	827	1180	561	20.8	308	710	424
MW3	ND (0.5)	ND (1.0)	ND (1.0)	ND(1.0)	ND (0.2)	ND (1.0)	ND (0.2)	ND (0.5)	NS	ND (0.5)	NS
MW4	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND (0.5)	2.9
MW8R	NS	NS	NS	NS	NS	ND (1)	NA	ND (0.5)	ND (0.5)	NS	1.2
MW9R	NS	NS	NS	NS	NS	914	293	864	NS	NS	317
MW12	NS	NS	NS	NS	NS	NS	NS	NS	NS	144	NS
MW13	NS	NS	NS	NS	NS	NS	NS	2060	NS	NS	NS
MW14	NS	NS	NS	NS	15800	12700	LPH	10700	11100	NS	NS
MW15	NS	NS	NS	NS	NS	NS	NS	4630	LPH	NS	NS
W1	NS	NS	NS	NS	NS	NS	NS	7720	NS	NS	NS
W3	NS	NS	NS	NS	NS	NS	NS	4180	NS	NS	14000
W6	NS	NS	NS	NS	NS	NS	NS	2990	NS	NS	NS
W8	NS	NS	NS	NS	NS	766	LPH	3520	NS	NS	NS
W9	36	130	720	330	487	ND (100)	667	92.9	10.4	NS	412
W10	NS	NS	NS	NS	NS	ND (25)	NS	NS	NS	NS	NS
W12	0.98	25	20	19	9.6	36	8.65	2.3	5.2	NS	NS
GM17	NS	NS	NS	NS	NS	NS	NS	457	NS	NS	NS
PZ8	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND (0.5)	NS
PZ11	NS	NS	NS	NS	NS	ND (1)	NS	NS	NS	NS	NS
PZ16	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND (0.5)	NS
PZ20	NS	NS	NS	NS	NS	8.64	36.4	58.2	9.3	31.8	NS
PZ22	NS	NS	NS	NS	NS	198	25.7	21.5	NS	NS	NS
TPZ5	NS	NS	NS	NS	NS	NS	NS	82.3	NS	NS	NS

- Notes:**
1. Compound concentrations are measured in micrograms per liter (ug/L).
 2. ND = Not Detected above method detection limits indicated in parenthesis.
 3. NS = Not Sampled.
 4. NA = Not analyzed for this compound.
 5. Shaded areas exceed NJDEP GWQS of 1 ug/L for Benzene.
 6. Refer to Third Quarter 1997 Status Report (Geraghty & Miller, November 4, 1997) for results prior to 1997.
 7. LPH = Liquid Phase Hydrocarbon Detected, well not sampled.

Table 5
Historical Groundwater Analytical Results Summary for Ethylbenzene
Former ARCO Terminal
Newark, NJ

Date Sampled:

Well #	1/28/97	4/22/97	7/22/97	12/23/97	1/28/98	5/19-21/98	8/3-4/98	11/2-3/98	2/3-4/99	5/11/99	8/10/99
MW1	ND (5.0)	ND (5.0)	ND (0.5)	ND (2.0)	ND (0.2)	ND (7)	ND (0.2)	ND (0.5)	ND (0.5)	NS	NS
MW2	32	58	12	29	91.6	182	ND (360)	5.6	3.4	42.6	8.7
MW3	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	ND (0.2)	ND (7)	ND (0.2)	ND (0.5)	ND (0.5)	ND (0.5)	NS
MW4	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND (0.5)	ND (0.5)
MW8R	NS	NS	NS	NS	NS	ND (7.2)	NA	ND (0.5)	ND (0.5)	NS	ND (0.5)
MW9R	NS	NS	NS	NS	NS	ND (72)	ND (36)	ND (10)	ND (5)	NS	ND (2.5)
MW12	NS	NS	NS	NS	NS	NS	NS	NS	NS	6.9	NS
MW13	NS	NS	NS	NS	NS	NS	NS	ND (50)	NS	NS	NS
MW14	NS	NS	NS	NS	1270	1010	LPH	516	731	NS	NS
MW15	NS	NS	NS	NS	NS	NS	NS	292	LPH	NS	NS
W1	NS	NS	NS	NS	NS	NS	NS	642	NS	NS	NS
W3	NS	NS	NS	NS	NS	NS	NS	162	NS	NS	352
W6	NS	NS	NS	NS	NS	NS	NS	939	NS	NS	NS
W8	NS	NS	NS	NS	NS	255	LPH	968	NS	NS	NS
W9	8.5	130	110	55	6.62	ND (700)	ND (0.2)	4.6	1.1	NS	10
W10	NS	NS	NS	NS	NS	ND (180)	NS	NS	NS	NS	NS
W12	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	ND (4.0)	J 8.4	ND (0.2)	ND (0.5)	ND (5)	NS	NS
GM17	NS	NS	NS	NS	NS	NS	NS	17.6	NS	NS	NS
PZ8	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND (0.5)	NS
PZ11	NS	NS	NS	NS	NS	ND (7.2)	NS	NS	NS	NS	NS
PZ16	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND (0.5)	NS
PZ20	NS	NS	NS	NS	NS	2.2J	ND (0.2)	1.8	ND (0.5)	ND (0.5)	NS
PZ22	NS	NS	NS	NS	NS	14.6	ND (0.2)	ND (0.5)	NS	NS	NS
TPZ-5	NS	NS	NS	NS	NS	NS	NS	7.3	NS	NS	NS

- Notes:**
1. Compound concentrations are measured in micrograms per liter (ug/L).
 2. ND = Not Detected above method detection limits indicated in parentheses.
 3. NS = Not Sampled.
 4. NA = Not analyzed for this parameter.
 5. J = Reported value is below the method detection limit.
The indicated result is, therefore, estimated.
 6. Shaded areas exceed NJDEP GWQS of 700 ug/L for Ethylbenzene.
 7. Refer to Third Quarter 1997 Status Report (Geraghty & Miller, November 4, 1997) for results prior to 1997.
 8. LPH = Liquid Phase Hydrocarbon detected, well not sampled.

Table 6
Historical Groundwater Analytical Results Summary for Toluene
Former ARCO Terminal
Newark, NJ

Date Sampled:

Well #	1/28/97	4/22/97	7/22/97	12/23/97	1/28/98	5/19-21/98	8/3-4/98	11/2-3/98	2/3-4/99	5/11/99	8/10/99
MW1	ND (0.5)	ND (0.5)	ND (0.5)	ND(2.0)	ND (0.2)	ND (6)	ND (0.2)	ND (0.5)	ND (0.5)	NS	NS
MW2	19	12	9	9	13.4	ND (100)	ND (300)	6.3	4.8	9	11.6
MW3	ND (0.5)	ND (0.5)	0.5	ND(2.0)	ND (0.2)	ND (6)	ND (0.2)	ND (0.5)	ND (0.5)	ND (0.5)	NS
MW4	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND (0.5)	2.9
MW8R	NS	NS	NS	NS	NS	ND(6)	NA	ND (0.5)	ND (0.5)	NS	ND (0.5)
MW9R	NS	NS	NS	NS	NS	10J	ND (30)	ND (10)	7.1	NS	ND (2.5)
MW12	NS	NS	NS	NS	NS	NS	NS	NS	NS	58.6	NS
MW13	NS	NS	NS	NS	NS	NS	NS	ND (50)	NS	NS	NS
MW14	NS	NS	NS	NS	2440	971	LPH	167	746	NS	NS
MW15	NS	NS	NS	NS	NS	NS	NS	217	LPH	NS	NS
W1	NS	NS	NS	NS	NS	NS	NS	1560	NS	NS	NS
W3	NS	NS	NS	NS	NS	NS	NS	149	NS	NS	7690
W6	NS	NS	NS	NS	NS	NS	NS	4650	NS	NS	NS
W8	NS	NS	NS	NS	NS	189	LPH	260	NS	NS	NS
W9	2.7	34	70	12	2.15	ND (600)	ND (0.2)	3.3	0.62	NS	10.2
W10	NS	NS	NS	NS	NS	ND (150)	NS	NS	NS	NS	NS
W12	ND (0.5)	0.91	1.4	ND(2.0)	ND (4.0)	J 24	ND (0.2)	1.1	ND (5)	NS	NS
GM17	NS	NS	NS	NS	NS	NS	NS	10.7	NS	NS	NS
PZ8	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND (0.5)	NS
PZ11	NS	NS	NS	NS	NS	ND (6)	NS	NS	NS	NS	NS
PZ16	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND (0.5)	NS
PZ20	NS	NS	NS	NS	NS	0.84J	ND (0.2)	2.0	0.56	1.4	NS
PZ22	NS	NS	NS	NS	NS	7J	ND (0.2)	1.8	NS	NS	NS
TPZ5	NS	NS	NS	NS	NS	NS	NS	7.7	NS	NS	NS

- Notes:**
1. Compound concentrations are measured in micrograms per liter (ug/L).
 2. ND = Not Detected above method detection limits indicated in parentheses.
 3. NS = Not Sampled.
 4. NA = Not analyzed for this parameter.
 5. J = Reported value is below the method detection limit.
The indicated result is, therefore, estimated.
 6. Shaded areas exceed NJDEP GWQS 1000 ug/L for Toluene.
 7. Refer to Third Quarter 1997 Status Report (Geraghty & Miller, November 4, 1997) for results prior to 1997.
 8. LPH = Liquid Phase Hydrocarbon detected, well not sampled

Table 7
Historical Groundwater Analytical Results Summary for Xylenes
Former ARCO Terminal
Newark, NJ

Date Sampled:

Well #	1/28/97	4/22/97	7/22/97	12/23/97	1/28/98	5/19-21/98	8/3-4/98	11/2-3/98	2/3-4/99	5/11/99	8/10/99
MW1	ND (1.5)	ND (1.5)	ND (1.5)	ND(4.0)	ND (1.0)	ND (4.0)	ND (1.0)	0.60	ND (0.5)	NS	NS
MW2	23	ND (30)	11.66	12	ND (25.0)	ND (80)	ND (200)	7.2	9.4	19.9	12.6
MW3	ND (1.5)	ND (1.5)	1.8	ND(4.0)	1.52	ND (4.0)	ND (1.0)	2.0	1.4	0.56	NS
MW4	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND (0.5)	2.6
MW8R	NS	NS	NS	NS	NS	ND (4)	NA	ND (0.5)	ND (0.5)	NS	ND (0.5)
MW9R	NS	NS	NS	NS	NS	ND (40)	ND (20)	ND (10)	9.1	NS	ND (2.5)
MW12	NS	NS	NS	NS	NS	NS	NS	NS	NS	85.6	NS
MW13	NS	NS	NS	NS	NS	NS	NS	ND (50)	NS	NS	NS
MW14	NS	NS	NS	NS	NS	2488	1,160J	182	839	NS	NS
MW15	NS	NS	NS	NS	NS	NS	NS	373	LPH	NS	NS
W1	NS	NS	NS	NS	NS	NS	NS	5780	NS	NS	NS
W3	NS	NS	NS	NS	NS	NS	NS	1770	NS	NS	5700
W6	NS	NS	NS	NS	NS	NS	NS	3890	NS	NS	NS
W8	NS	NS	NS	NS	NS	847	LPH	2390	NS	NS	NS
W9	NS	NS	NS	NS	NS	NS	NS	6.3	1.8	NS	28.8
W10	NS	NS	NS	NS	NS	ND (100)	NS	NS	NS	NS	NS
W12	ND (1.5)	1.4	2.9	ND(4.0)	ND (20.0)	ND (80)	ND (1.0)	4.4	ND (5)	NS	NS
GM17	NS	NS	NS	NS	NS	NS	NS	26.8	NS	NS	NS
PZ8	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.64	NS
PZ11	NS	NS	NS	NS	NS	ND (4)	NS	NS	NS	NS	NS
PZ16	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND (0.5)	NS
PZ20	NS	NS	NS	NS	NS	2.79	ND (1.0)	5.3	0.75	2.2	NS
PZ22	NS	NS	NS	NS	NS	9.19	ND (1.0)	1.4	NS	NS	NS
TPZ5	NS	NS	NS	NS	NS	NS	NS	10.0	NS	NS	NS

- Notes:**
1. Compound concentrations are measured in micrograms per liter (ug/L).
 2. ND = Not Detected above method detection limits indicated in parentheses.
 3. NS = Not Sampled.
 4. NA = Not Analyzed for this parameter.
 5. J = Reported value is below the method detection limit.
 6. Shaded areas exceed NJDEP GWQS of 1000 ug/L for Total Xylenes.
Refer to Third Quarter 1997 Status Report (Geraghty & Miller,
November 4, 1997) for results prior to 1997.
 7. LPH = Liquid Phase Hydrocarbon detected, well not sampled.

Table 8
Historical Groundwater Analytical Results Summary for Naphthalene
Former ARCO Terminal
Newark, NJ

Date Sampled:

Well #	1/28/97	4/22/97	7/22/97	12/23/97	1/28/98	5/19-21/98	8/3-4/98	11/2-3/98	2/3-4/99	5/11/99
MW1	ND (2.0)	ND (2.0)	ND (2.0)	ND(2.0)	ND (2.0)	ND (1.6)	ND (1.0)	6.3	ND (0.5)	NS
MW2	14	15	5.4	19	42.9	107	ND (200)	9.2	4.2	NS
MW3	ND (2.0)	ND (2.2)	ND (2.0)	ND(2.0)	ND (2.0)	ND (1.6)	ND (1.0)	1.9	0.64	0.56
MW4	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND (0.5)
MW8R	NS	NS	NS	NS	NS	NS	NS	NS	ND (0.5)	NS
MW9R	NS	NS	NS	NS	NS	NS	NS	NS	ND (5)	NS
MW12	NS	NS	NS	NS	NS	NS	NS	NS	NS	3.1
MW14	NS	NS	NS	NS	NS	NS	NS	NS	139	NS
W9	ND (2.0)	3.6	ND (2.0)	3.5	ND (2.0)	ND (1.6)	ND (1.0)	3.8	0.77	NS
W12	ND (2.0)	ND (2.0)	ND (2.0)	ND(2.0)	ND (2.0)	ND (1.6)	ND (1.0)	4.3	ND (5)	NS
PZ8	NS	NS	NS	NS	NS	NS	NS	NS	NS	2.0
PZ16	NS	NS	NS	NS	NS	NS	NS	NS	NS	ND (0.5)
PZ20	NS	NS	NS	NS	NS	NS	NS	NS	4.6	NS

- Notes:**
1. Compound concentrations are measured in micrograms per liter (ug/L).
 2. ND = Not Detected above method detection limits indicated in parentheses.
 3. NS = Not Sampled.
 4. NA = Not Analyzed for this parameter.
 5. Shaded areas exceed NJDEP GWQS of 300 ug/L for naphthalene.
 6. Refer to Third Quarter 1997 Status Report (Geraghty & Miller, November 4, 1997) for results prior to 1997.
 7. LPH = Liquid Phase Hydrocarbon detected, well not sampled.
 8. Due to very low-level concentrations of naphthalene detected in site wells during past sampling events, the site wells were not sampled for naphthalene during the current (August 10, 1999) sampling event.

Table 9
Historical Groundwater Analytical Results Summary for
Methyl Tert-Butyl Ether (MTBE)
Former ARCO Terminal
Newark, NJ

Date sampled:

Well #	5/19-21/98	8/3-4/98	11/2-3/98	2/3-4/99	5/11/99	8/10/99
MW1	12	NS	NS	57.1	NS	NS
MW2	ND (200)	NS	NS	90.4	NS	191
MW3	9.4J	NS	NS	24.6	NS	NS
MW4	NS	NS	NS	NS	1.2	1.1
MW8R	15.7	20	ND (0.5)	76.6	NS	50.4
MW9R	ND (100)	NS	NS	19.6	NS	8.4
MW12	NS	NS	NS	NS	ND (1.2)	NS
MW13	NS	NS	12100	NS	NS	NS
MW14	2250	NS	3130	2560	NS	NS
MW15	NS	NS	394	LPH	NS	NS
W1	NS	NS	3800	NS	NS	NS
W3	NS	NS	4720	NS	NS	5400
W6	NS	NS	ND (50)	NS	NS	NS
W8	79J	NS	ND (25)	NS	NS	NS
W9	ND (1000)	NS	NS	95.8	NS	ND (2.5)
W10	ND (250)	NS	NS	NS	NS	NS
W12	600	NS	NS	684	NS	NS
GM17	NS	NS	368	NS	NS	NS
PZ8	NS	NS	NS	NS	16.0	NS
PZ11	3.1J	NS	NS	NS	NS	NS
PZ16	NS	NS	NS	NS	57.5	NS
PZ20	ND (10)	NS	NS	11.7	NS	NS
PZ22	ND (20)	NS	NS	NS	NS	NS
TPZ5	NS	NS	24.6	NS	NS	NS

Notes:

1. Compound concentrations are measured in micrograms per liter (ug/L).
2. ND = Not Detected above method detection limits indicated in parentheses.
3. NS = Not Sampled.
4. Shaded areas exceed NJDEP GWQS (non-promulgated) of 70 ug/l for MTBE.
5. LPH = Liquid Phase Hydrocarbon detected, well not sampled.

Table 10
Historical Groundwater Analytical Results Summary for
Tertiary Butyl Alcohol (TBA)
Former ARCO Terminal
Newark, NJ

Date Sampled:

Well #	5/19-21/98	8/3-4/98	11/2-3/98	2/3-4/99	5/11/99	8/10/99
MW1	538	NS	NS	4380	NS	NS
MW2	7880	20000	70600	34500	NS	24400
MW3	207	NS	NS	ND (100)	NS	NS
MW4	NS	NS	NS	NS	ND (100)	ND (100)
MW8R	846	NS	2430	1470	NS	217
MW9R	1120	900	7190	3400	NS	2010
MW12	NS	NS	NS	NS	ND (250)	NS
MW13	NS	NS	534000	NS	NS	NS
MW14	29800	NS	158000	ND (10000)	NS	NS
MW15	NS	NS	47200	LPH	NS	NS
W1	NS	NS	124000	NS	NS	NS
W3	NS	NS	40900	NS	NS	ND (5000)
W6	NS	NS	120000	NS	NS	NS
W8	9320	NS	135000	NS	NS	NS
W9	14300	NS	NS	9450	NS	ND (500)
W10	7270	NS	NS	NS	NS	NS
W12	1180	NS	NS	ND (1000)	NS	NS
GM17	NS	NS	34900	NS	NS	NS
PZ8	NS	NS	NS	NS	204	NS
PZ11	394	NS	NS	NS	NS	NS
PZ16	NS	NS	NS	NS	744	NS
PZ20	ND (20)	NS	NS	NS (100)	NS	NS
PZ22	98.3	NS	NS	NS	NS	NS
TPZ5	NS	NS	2120	NS	NS	NS

Notes:

1. Compound concentrations are measured in micrograms per liter (ug/L).
2. ND = Not Detected above method detection limits indicated in parentheses.
3. NS = Not Sampled.
4. NA = Not Analyzed for this parameter.
5. J = Reported value is below the method detection limit.
6. Shaded areas exceed NJDEP GWQS (non-promulgated) of 100 ug/l for MTBE.
7. LPH = Liquid Phase Hydrocarbon detected, well not sampled.

TABLE 11
PROPOSED GROUNDWATER SAMPLING FOR FOURTH QUARTER 1999 EVENT
FORMER ARCO TERMINAL
NEWARK, NEW JERSEY

WELLS TO BE SAMPLED	ANALYSES
MW2, MW4, MW8R, MW9R, MW14, W9 MW2, MW9R, W3 MW9R, W3	BTEX, MTBE and TBA (Method 602) Arsenic (Method EPA 200.7) Lead (Method EPA 200.7)

NOTES:

1. Volatile parameters will be collected using a dedicated bailer following purging of the well until indicator parameters stabilize. Metals will be collected separately with a pump and dedicated line at low-flow purge and sample rates.
2. The metals sampling outlined above (Arsenic and Lead) is resampling of wells exhibiting exceedances of GWQS for these parameters during the previous sampling event (May 11, 1999).

TABLE 12
LIQUID PHASE HYDROCARBONS (LPH) THICKNESS (FT)
JANUARY-OCTOBER 1999
FORMER ARCO TERMINAL
NEWARK, NJ

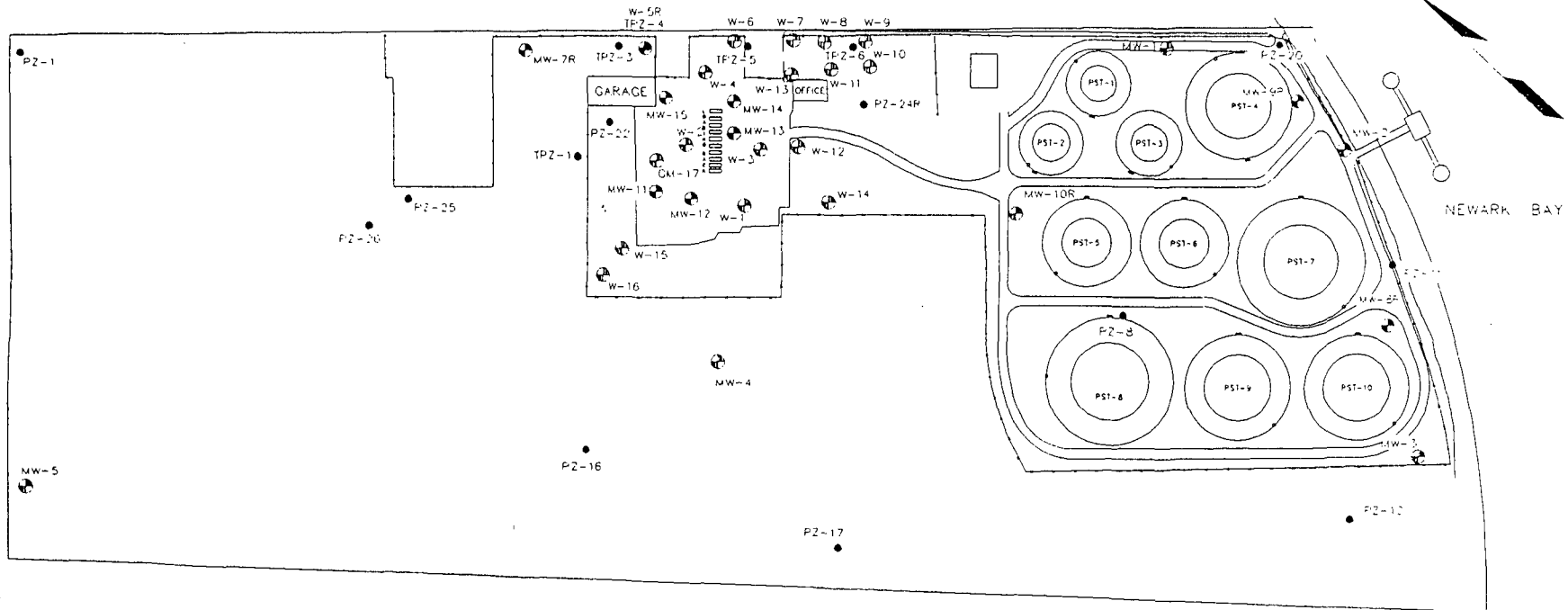
GAUGE DATE	MW11*	MW12	MW13	MW14	MW15*	GM17	W1	W2	W3	W5R	W6	W15
1/12/99	0.00	0.00	NM	0.00	Sheen	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/3/99	0.00	0.00	Sheen	0.00	Hvy Sheen	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/11/99	0.00	0.00	0.04	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00
4/8/99	0.00	0.00	0.01	0.00	0.01	0.01	0.00	Sheen	Sheen	0.00	0.00	0.00
5/11/99	0.00	0.00	0.42**	0.01	Hvy Sheen	0.02**	0.00	0.00	0.00	0.00	0.00	0.00
6/3/99	0.01***	0.00	0.05***	0.00	0.04***	0.05***	0.00	Lt Sheen	Lt Sheen	0.00	0.00	0.00
7/21/99	0.03	0.00	0.04	0.02	0.02	0.10	0.00	0.03	0.00	0.00	0.00	0.01
8/10/99	0.01	0.00	0.05	0.02	0.04	0.07	0.00	Sheen	0.00	0.00	0.00	0.01
8/19/99	0.00	0.00	0.25****	0.04****	0.00	0.04****	0.00	0.00	0.00	0.00	Lt Sheen	Lt Sheen
10/18/99	0.00	0.00	Sheen	0.00	Lt Sheen	0.02	0.00	0.00	Lt Sheen	Lt Sheen	0.00	Lt Sheen

Notes:

1. NM - Not Measured
2. Sheen < 0.01 ft.
3. * PetroTrap LPH collectors were placed in these wells on February 3, 1999 and were serviced monthly.
4. ** The PetroTrap LPH collectors were moved to these wells on May 11, 1999. Monthly servicing continues.
5. *** These wells were pumped on June 3, 1999 to recover accumulated LPH.
6. **** These wells were pumped on August 19, 1999 to recover accumulated LPH.

FIGURES

DELANCY STREET



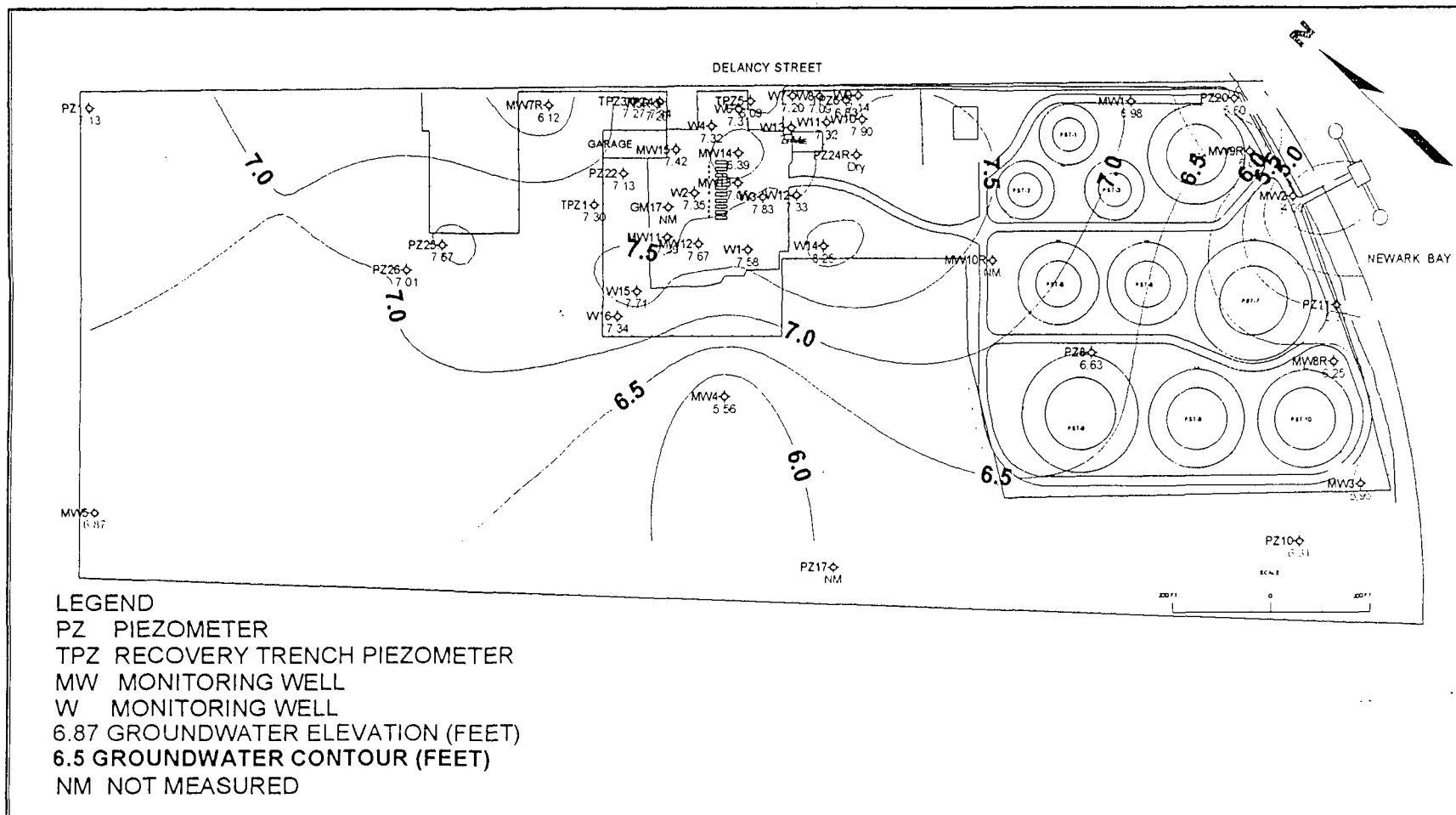
END

- PZ-1 PIEZOMETER LOCATION AND DESIGNATION
- TPZ-1 RECOVERY TRENCH PIEZOMETER LOCATION AND DESIGNATION
- PZ-26 DAMAGED PIEZOMETER LOCATION AND DESIGNATION
- MW-1 MONITORING WELL LOCATION AND DESIGNATION
- MW-17 DAMAGED MONITORING WELL LOCATION AND DESIGNATION

ENC	SITE PLAN			AMERADA HESS CORPORATION FORMER ARCO TERMINAL 1111 DELANCY STREET NEWARK, NEW JERSEY
PREPARED BY:	DATE:	SCALE:	DRAWN BY:	
1	9/19/99	AS SHOWN	DSF	

MODIFIED AFTER GERAGHTY & MILLER, INC (AFTER ROUX ASSOCIATES, INC.)
S:\DELANCY\DELANCY.DWG

960570033



FWENC

FIGURE 2.
AUGUST 1999 GROUNDWATER POTENTIOMETRIC MAP

Filename: pptfigs.ppt

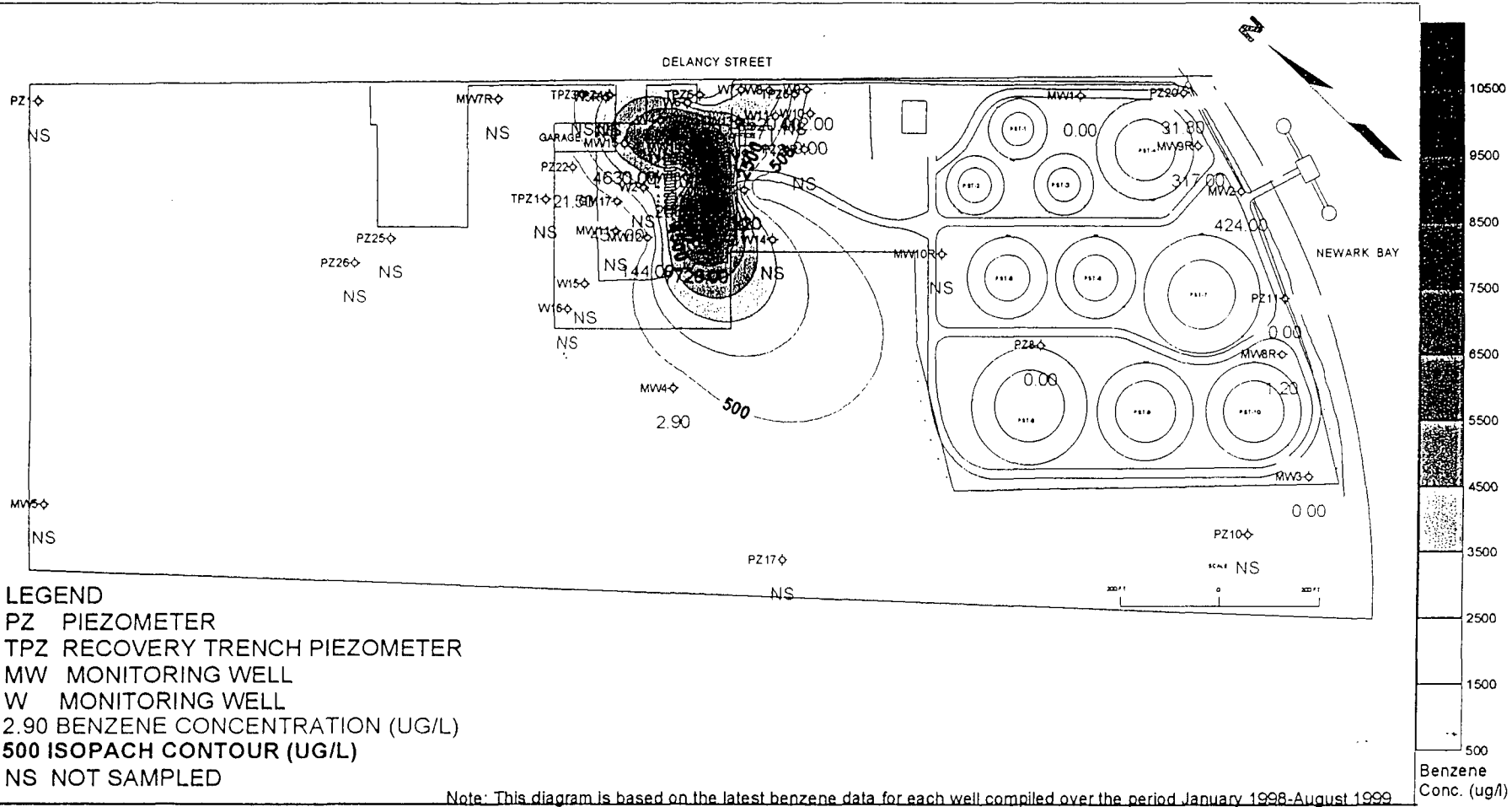
3RD QUARTER 1999 PROGRESS REPORT
OCTOBER 1999

Drawn By:
DSF

Date:
8-24-99

Scale:
As Shown

960570034



FWENC

FIGURE 3.
BENZENE ISOPLETH MAP, 1998-1999 GROUNDWATER DATA

Filename: pptfigs.ppt

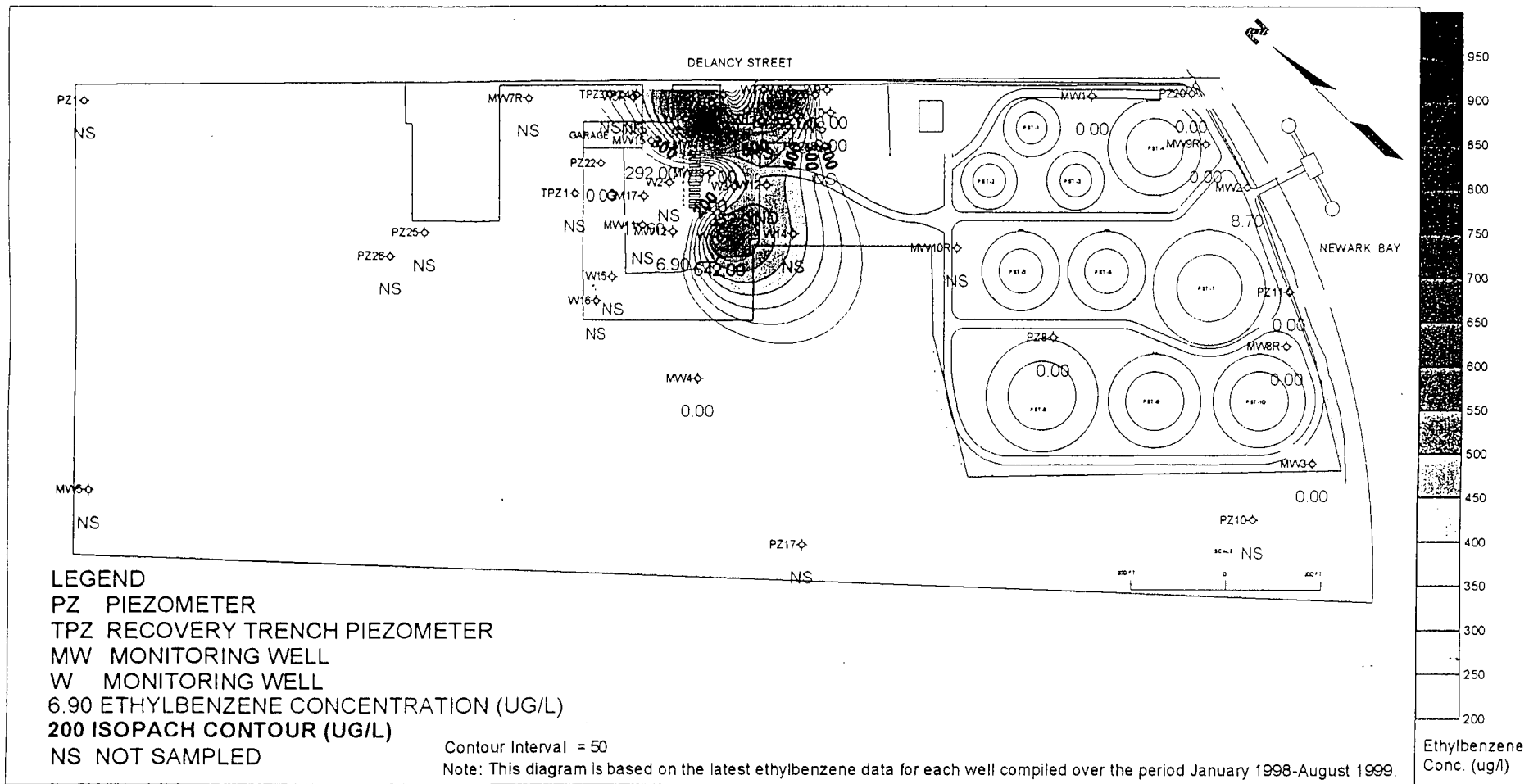
3RD QUARTER PROGRESS REPORT
OCTOBER 1999

Drawn By:
DSF

Date:
10-20-99

Scale:
As Shown

960570035



FWENC

FIGURE 4.
ETHYLBENZENE ISOPLETH MAP, 1998-1999 GROUNDWATER DATA

Filename: pptfigs.ppt

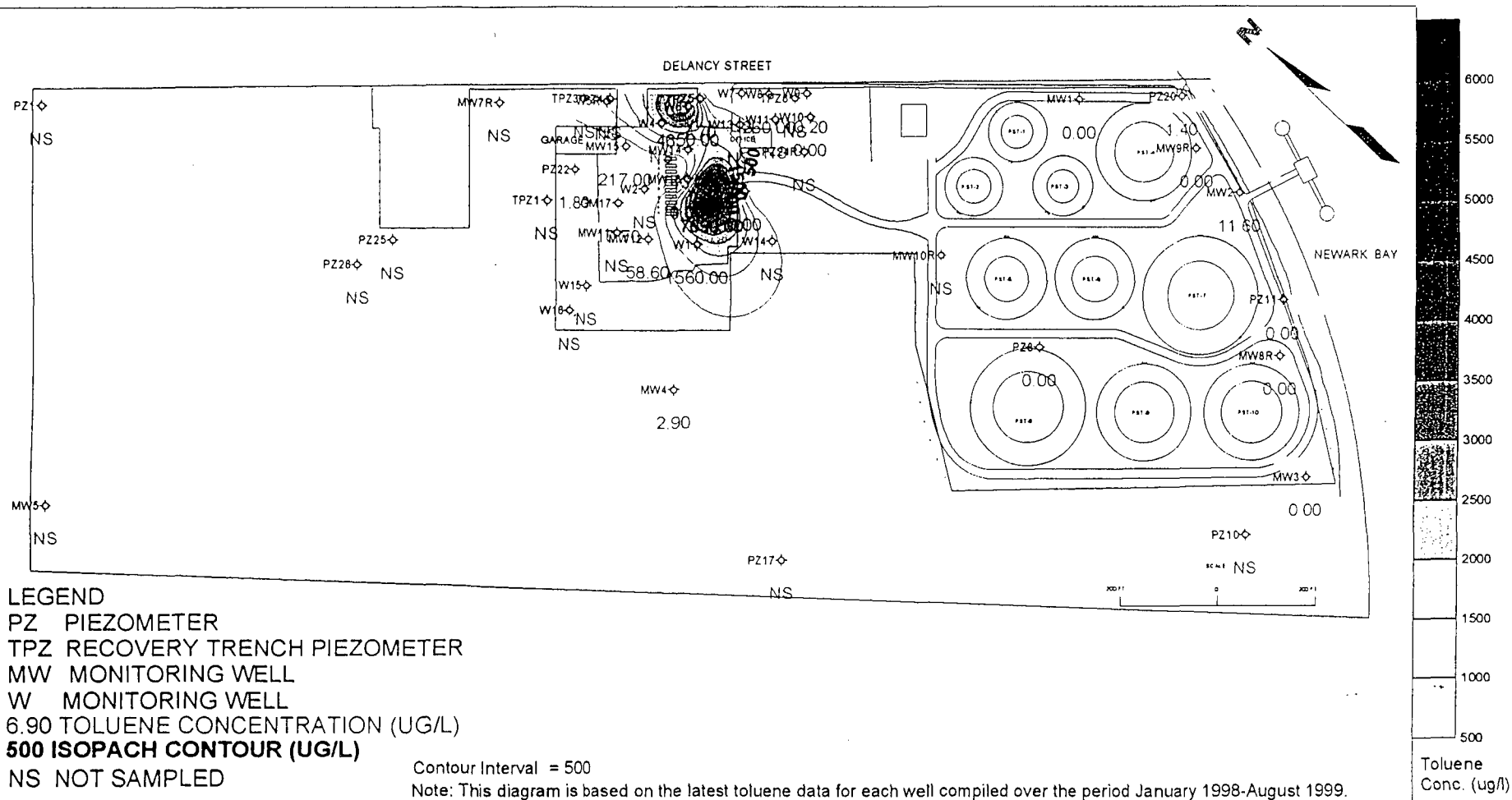
3RD QUARTER PROGRESS REPORT
OCTOBER 1999

Drawn By:
DSF

Date:
10-20-99

Scale:
As Shown

960570036



FWENC

FIGURE 5.
TOLUENE ISOPLETH MAP, 1998-1999 GROUNDWATER DATA

Filename: pptfigs.ppt

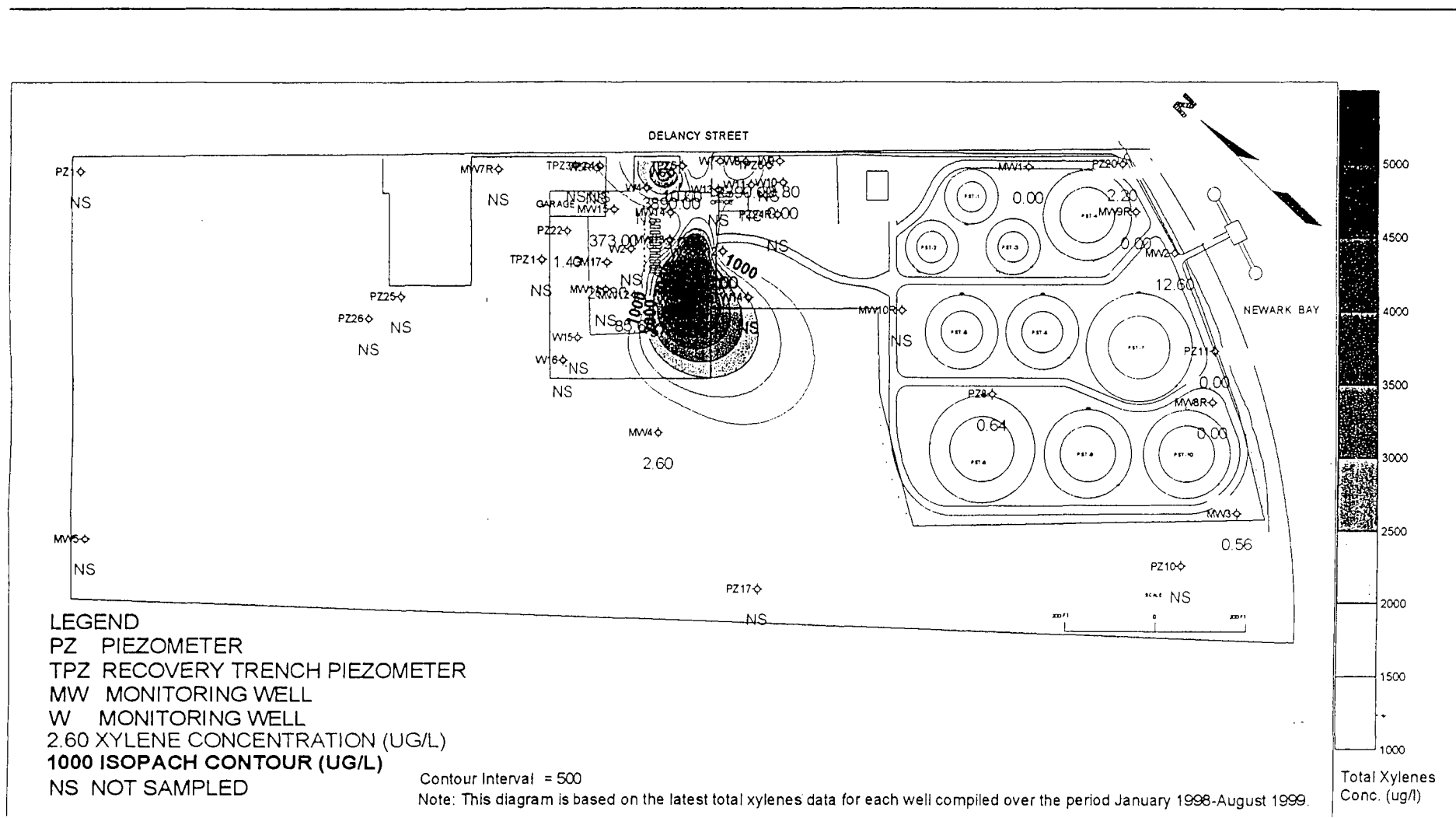
3RD QUARTER PROGRESS REPORT
OCTOBER 1999

Drawn By:
DSF

Date:
10-20-99

Scale:
As Shown

960570037



FWENC

FIGURE 6.
 TOTAL XYLENES ISOPLETH MAP, 1998-1999 GROUNDWATER DATA

Filename: pptfigs.ppt

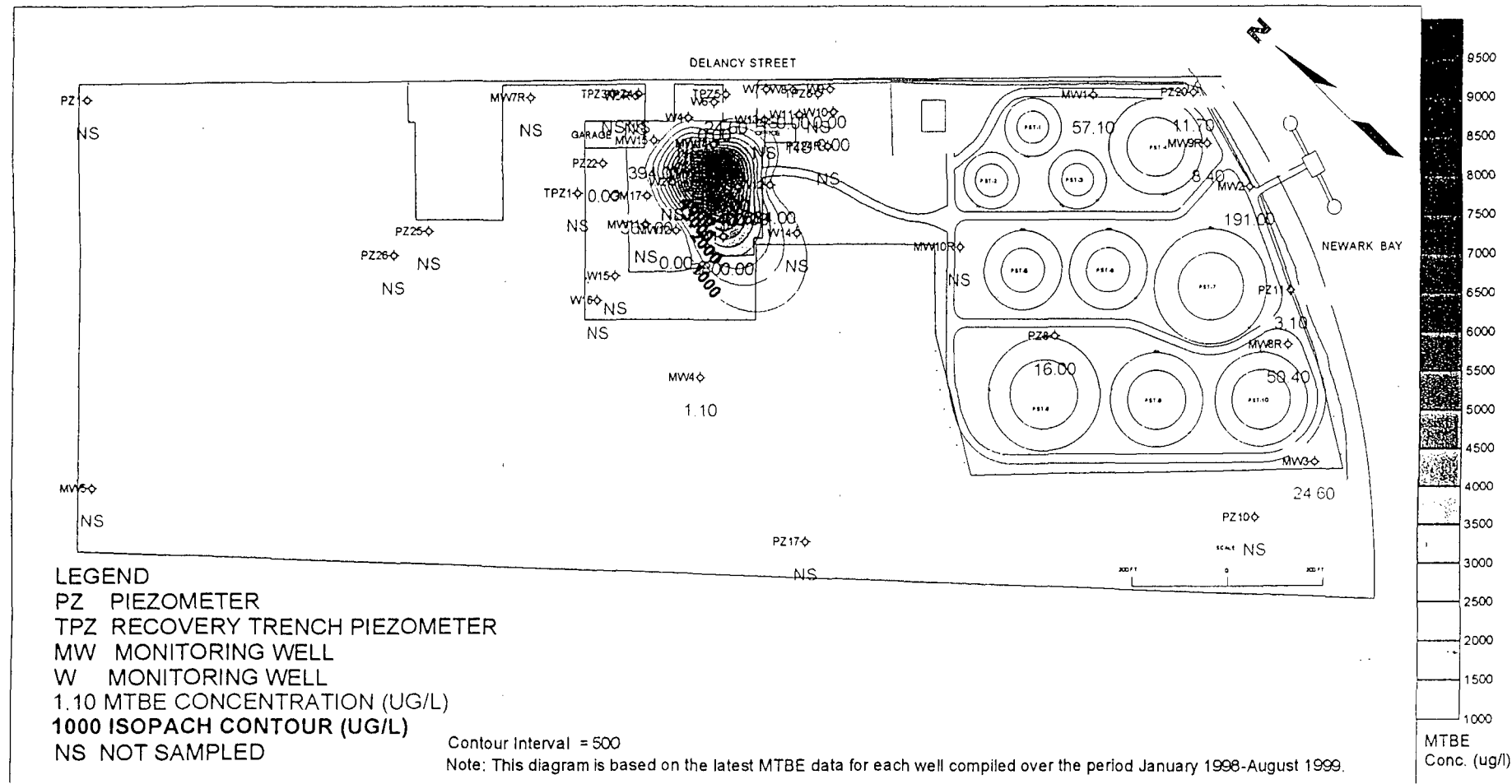
3RD QUARTER PROGRESS REPORT
 OCTOBER 1999

Drawn By:
 DSF

Date:
 10-20-99

Scale:
 As Shown

960570038



FWENC

FIGURE 7.
 MTBE ISOPLETH MAP, 1998-1999 GROUNDWATER DATA

Filename: pptfigs.ppt

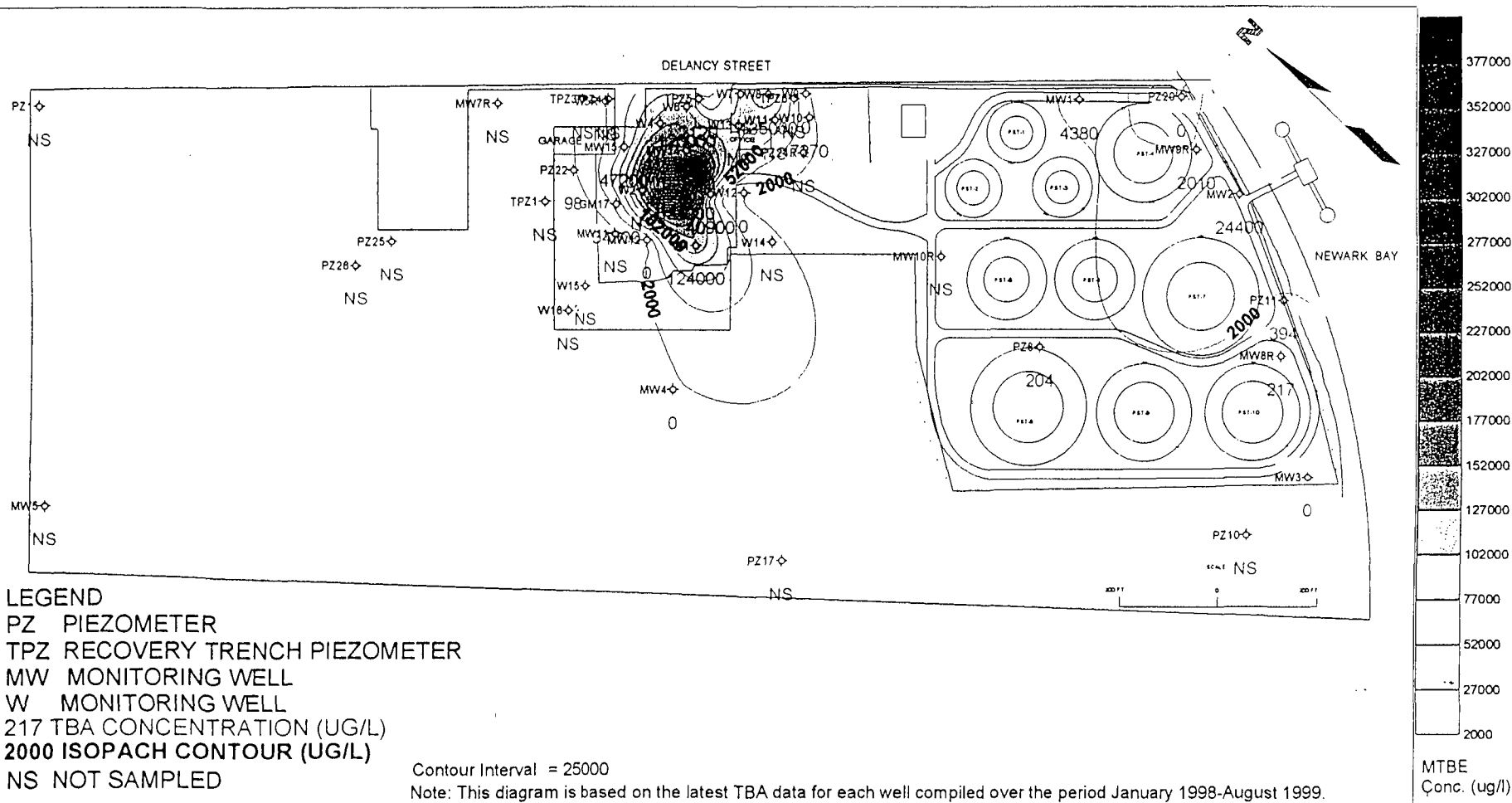
3RD QUARTER PROGRESS REPORT
 OCTOBER 1999

Drawn By:
 DSF

Date:
 10-20-99

Scale:
 As Shown

960570039



FWENC

FIGURE 8.
 TBA ISOPLETH MAP, 1998-1999 GROUNDWATER DATA

Filename: pptfigs.ppt

3RD QUARTER PROGRESS REPORT
 OCTOBER 1999

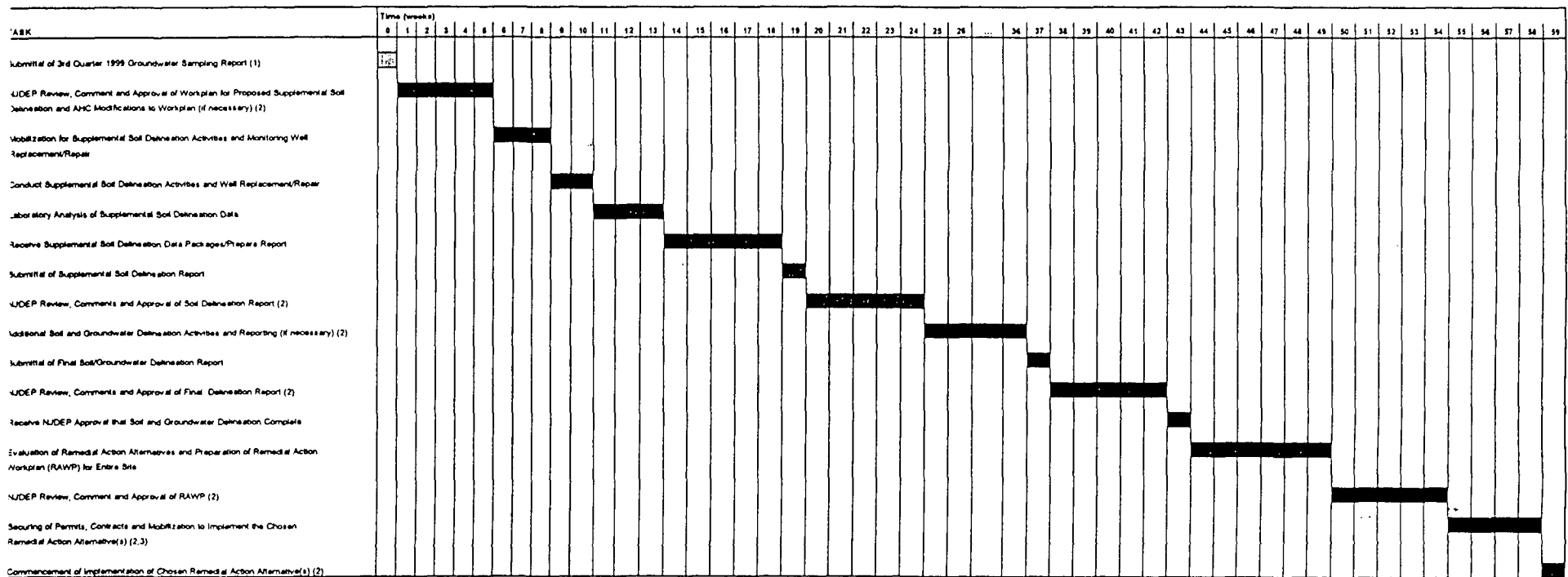
Drawn By:
 DSF

Date:
 10-20-99

Scale:
 As Shown

960570040

**FIGURE 9
IMPLEMENTATION SCHEDULE
FORMER ARCO DELANCY STREET TERMINAL, NEWARK, NEW JERSEY**



1. starting date for the above schedule is October 29, 1999, the due date of the 3rd Quarter 1999 Remedial Action Progress Report
 2. AHC will implement the Supplemental Soil Delineation Workplan when the NUDEP has approved it and deemed it complete.
 3. time requirements for these activities are estimated
 4. appropriate remedial action alternatives cannot be chosen until delineation is completed. AHC will evaluate alternatives including administrative controls (land restriction, CEA), institutional controls (paving, gravel), and active remediation options (soil removal, in-situ treatment, bioremediation, natural attenuation, steam extraction, pumping), and will implement those alternatives which are best suited for this site.
 5. in order to minimize the number of report submittals, AHC will combine the submittals listed above with routine quarterly reports where possible.
 6. quarterly report submittals have not been included in the above schedule since this schedule is subject to change (see note 2 above).

TOTAL ESTIMATED TIME (TO REMEDIAL ACTION IMPLEMENTATION) = 59 WEEKS

LEGEND
 COMPLETED
 PENDING